

## Claims

- [c1] 1.A drying process for removing contaminants from a substrate having a low k dielectric layer thereon in a process chamber, the process comprising:  
exposing the low k dielectric layer to photons; and  
simultaneously with, prior to, or subsequent to the photon exposure, exposing the substrate to a process effective to remove the contaminants without causing degradation of the low k dielectric layer, wherein the process is selected from the group consisting of a heat process, a vacuum process, an oxygen free plasma process, and combinations thereof.
- [c2] 2.The drying process of Claim 1, wherein the photons are generated by ultraviolet light radiation or x ray radiation.
- [c3] 3.The drying process of Claim 1, wherein the low k dielectric layer comprises a porous or non-porous doped oxide material, and wherein the heat process comprises heating the substrate to a temperature of about 20 ° C to about 400 ° C.
- [c4] 4.The drying process of Claim 1, wherein the low k dielectric layer comprises a porous or non-porous doped oxide material, and wherein the heat process comprises heating the substrate to a temperature of about 100 ° C to about 300 ° C.
- [c5] 5.The drying process of Claim 1, wherein the low k dielectric layer comprises an organic material, and wherein the heat process comprises heating the substrate to a temperature of about 80 ° C to about 180 ° C.
- [c6] 6.The drying process of Claim 1, wherein the photons incident to the substrate have an energy density of about 10 milliwatts per square centimeter to about 1 watt per square centimeter.
- [c7] 7.The drying process of Claim 1, wherein the vacuum process comprises decreasing a pressure about the substrate to about 1 to about 10 milliTorr.
- [c8] 8.The drying process of Claim 1, further comprising purging the process chamber with an inert gas.

- [c9] 9.A process for removing contaminants adsorbed, adhered, or trapped within a low k dielectric layer, wherein the contaminants comprise residual water, moisture, silanols, residual plasma or wet etch chemistries residuals of wet clean chemistries, acids, bases, and solvents, the process comprising: exposing the low k dielectric layer in a process chamber to radiation comprising a wavelength of about 150 nanometers to about 500 nanometers; and exposing the substrate to an oxygen free plasma or heat or a vacuum or a combination thereof to remove the contaminants without causing degradation of the low k dielectric layer.
- [c10] 10.The process of Claim 9, wherein the low k dielectric layer comprises a porous material or doped oxide material, and wherein heating the substrate comprises a temperature of about 20<sup>°</sup> C to about 400<sup>°</sup> C.
- [c11] 11.The process of Claim 9, wherein the low k dielectric layer comprises a porous material or doped oxide material, and wherein heating the substrate comprises a temperature of about 100<sup>°</sup> C to about 300<sup>°</sup> C.
- [c12] 12.The process of Claim 9, wherein the low k dielectric layer comprises an organic material, and wherein heating the substrate comprises a temperature of about 80<sup>°</sup> C to about 180<sup>°</sup> C.
- [c13] 13.The process of Claim 9, wherein reducing the pressure comprises lowering the pressure in the process chamber to less than about 1 to about 10 milliTor.
- [c14] 14.The process of Claim 9, wherein exposing the low k dielectric layer to the radiation comprises a time of less than about 120 seconds.
- [c15] 15.The process of Claim 9, wherein exposing the low k dielectric layer to the radiation comprises a time of less than about 60 seconds.
- [c16] 16.The process of Claim 9, wherein the plasma is formed from a gas composition comprising a hydrogen bearing gas and an inert gas.
- [c17] 17.A drying process for removing contaminants from a substrate having a low k dielectric layer thereon in a process chamber, the process comprising:

exposing the low k dielectric layer to electromagnetic radiation; and  
simultaneously with, prior to, or subsequent to the radiation exposure,  
exposing the substrate to a process effective to remove the contaminants  
without causing degradation of the low k dielectric layer, wherein the process is  
selected from the group consisting of a heat process, a vacuum process, an  
oxygen free plasma process, and combinations thereof.